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ABSTRACT

The present project was addressed to predicted success in a correspondence course. No specific hypotheses were formulated. Three schemes of analysis were conducted. The results are presented for each plan, and comparisons between the results are made. Further, recommendations for future studies are suggested. (Author)

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SOME CORRELATES OF SUCCESS IN CORRESPONDENCE STUDY

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INTRODUCTION

It has been found that the number of individuals enrolling in correspondence courses is increasing. Yet, approximately 60% of the students who participate in correspondence study do not successfully complete the course (Anderson & Tippy, 1971). These students either receive a failing grade, withdraw before completing the course, or request an extension to fulfill course requirements and subsequently do not complete those requirements.

This study is directed toward identifying the variables that contribute to success in a correspondence course as defined by course grade. No specific hypotheses have been formulated as there appears to be insufficient evidence available to warrant posing specific research questions. Hence, this project is an exploratory study.

METHOD

Subjects

Approximately 3500 students were enrolled in correspondence courses during the Fall semester of 1970. A sample of 486 students was chosen by selecting every eighth student from the Fall correspondence course enrollment. This method of sampling is not recommended for inferential studies. However, as discussed by Anderson and Tippy (1971), the administrative ease of preparing the materials and the approximation of this procedure to simple random sampling warranted its use.

One hundred thirty-four of the 486 students to whom materials were mailed completed and returned them within the specified time interval. The present study is based on the responses of these 134 students.

Materials

Responses to 15 questionnaire items provided the major portion of the information utilized in the present study. The questionnaire (see Appendix A) consisted of 14 items to which students were asked to respond by circling the most appropriate alternative in each question. The remaining item required a short written response. The first 13 items were addressed to correspondence courses and correspondence study. Item 14 asked students to list individuals (i.e., family members, friends, employers, etc.) who were helpful or gave special encouragement to them while they were taking the course. Item 15 contained several reasons why students opt to enroll in correspondence courses rather than in live-classroom courses. For this item, students were instructed to indicate on a scale of 1 to 4 how important each factor was in their decision to

enroll in correspondence study. Presented in Appendix A is a sample questionnaire.

Procedure

The questionnaire data were collected by Anderson and Tippy (1971). Basically, these researchers mailed the questionnaire and a cover letter to the 486 students described above. The students were instructed to complete the questionnaire and return it within one week, or to enclose it with their next correspondence lesson. One hundred thirty-four individuals returned the questionnaire. No attempt was made to mail follow-up letters to students who had not returned the materials.

As the materials were returned, the following information was coded onto the questionnaire by the Correspondence Office personnel: (a) hours of course credit, (b) course level, i.e., 100, 200, 300, 400, (c) number of lessons in the course, and (d) the educational level in units of the student. When course grades were available, they were also coded onto the questionnaire.

Analyses

For the analyses, the responses to the following questionnaire items were examined: 1, 2, 4, 6, 8, 10, 12, and 15. Item 15, however, contained 11 items, all of which were used. Thus, the responses to 18 itesm were used. Further, hours of course credit, course level, number of lessons in the course, educational level, and course grade were included. Course grade was recoded as (a) 4=A, (b) 3=B, (c) 2=C, (d) 1=D, and (e) 0=E, withdrawal, or request for an extension to complete the course and subsequent failure to meet that extension. Additionally, the verbal responses

of students to questionnaire item 14 were coded as (a) 1=no help or encouragement, (b) 2=encouragement or help from family or friends, and (c) 3=encouragement or assistance from instructor or employer, and were included in the analysis. Since each item was considered a variable, there were 24 variables in total, i.e., 18 questionnaire items plus the six additional items described above.

Three schemes of analysis were conducted. In some cases, students did not respond to all questionnaire items or part of the additional information coded onto the questionnaire was not available. The manner in which missing data were handled is included in the outline description of the analyses. Presented below is a brief outline of each plan of analysis.

Scheme I:

1. Missing data correlations were computed using responses from the 18 questionnaire items.

2. A principal components factor analysis was performed using the missing data correlation matrix.

3. A varimax rotation procedure was performed on the factors resulting from the principal components analysis.

4. Factor scores were computed by multiplying the matrix of responses to the 18 questionnaire items by the matrix of factor weightings obtained from the factor analysis and varimax procedure. Missing questionnaire data were handled by supplying the appropriate mean value for each piece of missing information. Mean values were supplied in the following items: 1 (131), 2 (133), 3 (115), 4 (133), 7 (133), 9 (133), 10 (133), 12 (133), 13 (133), 16 (133), and 18 (133). Enclosed in parentheses is the number

of students who responded to each item. It has been noted that 134 students were sampled.

5. The factor score matrix and the matrix of responses for variables 19-24 were horizontally augmented. Missing data for variables 19-24 were dealt with as outlined in step four above for variables 1-18. Mean values were supplied in the following items: 19 (119) and 24 (123).

6. Stepwise multiple regression was performed on the augmented matrix described in step five.

(Presented in Appendix B is a brief description of variables 1-24.)

Scheme II:

1. Pearson product-moment coefficients were computed using the responses from the 18 questionnaire items. Missing data were handled by supplying the appropriate mean value for each piece of missing information. Listed in step four of Scheme I are the items for which means were supplied.

2. A principal components factor analysis was conducted using the Pearson correlation matrix.

3. A varimax rotation procedure was performed on the factors resulting from the principal components analysis.

Steps 4, 5, and 6 are as described in Scheme I.

Scheme III:

1. Stepwise multiple regression was performed using all 24 variables. Missing data were handled by substituting the appropriate mean value for each piece of missing information.

RESULTS

Detailed results for the principal components factor analysis (Schemes I and II) and for the stepwise multiple regression (Schemes I, II, and III) will be presented. The results will be summarized in tabular form and described very briefly.

Presented in Tables 1 and 2 are the item weightings of the five orthogonal factors extracted from the 18 questionnaire items. Displayed in Table 1 are the results for Scheme I, while the results of Scheme II are summarized in Table 2.

Insert Tables 1 and 2 about here

By examining Tables 1 and 2, it can be noted that the item weightings resulting from Scheme I do not differ substantially from those obtained in Scheme II. It can also be observed that the factor patterns are identical. It appears that the two schemes do not yield discrepant results. Summarized in Table 3 is a description of each of the five factors. Suggested labels for the factors are also listed in Table 3.

Insert Table 3 about here

Displayed in Tables 4, 5, and 6 are the results of the stepwise multiple regression procedure. The F-level for entering and removing a variable was 2.0. The criterion variable, i.e., the dependent variable, was success in a correspondence course as defined by grade.

Insert Tables 4, 5 and 6 about here

Table 1

Item Weightings[1] of Five Factors Extracted from 18 Questionnaire Items: Scheme I

Questionnaire Item	Factor 1	2	3	4	5
1	.0610	.1565	.0128	.2524	-.4332*
2	-.0135	.0274	.0974	.3195	.6425*
3	-.0034	-.1352	-.0423	-.0176	.7678*
4	.0791	.1892	.0907	.5421*	-.1036
5	-.1730	.5400*	.2448	.4547*	-.1235
6	.0494	.6719*	.1016	-.0076	-.1126
7	.1029	.6524*	-.0869	.0820	-.0588
8	.3046	.0492	.0899	-.0670	.4522*
9	.5449*	-.3431	.4436*	-.2362	.0613
10	.6040*	.0777	-.0713	.0920	-.3376
11	.6788*	.3733	-.0639	.0841	.1509
12	.2702	-.1541	-.7480*	.1062	.0626
13	.6492*	-.2824	.1645	-.0205	.0080
14	.5613*	.2166	.1541	.0842	.1685
15	.2306	-.0351	.7351*	.0808	.1553
16	.2639	.0169	.6103*	.1962	.0079
17	.0780	.3190	.0099	.5239*	.1475
18	-.0200	-.2943	-.0471	.7773*	.0039

[1]Rounded to four decimal places.

*Weightings with absolute values of .40 or greater.

Table 2

Item Weightings[1] of Five Factors Extracted from 18 Questionnaire Items: Scheme II

Questionnaire Item	Factor 1	2	3	4	5
1	.0548	.1496	.0136	.2570	-.4356*
2	-.0030	.0246	.0976	.3233	.6375*
3	-.0023	-.1233	-.0424	-.0159	.7528*
4	.0777	.1910	.0926	.5420*	-.1097
5	-.1745	.5422*	.2470	.4511*	-.1214
6	.0470	.6778*	.1019	-.0157	-.1095
7	.1017	.6480	-.0865	.0820	-.0590
8	.3131	.0451	.0893	-.0641	.4384*
9	.5465*	-.3449	.4403*	-.2332	.0554
10	.5990*	.0707	-.0723	.0984	-.3555
11	.6803*	.3754	-.0667	.0821	.1407
12	.2666	-.1487	-.7491*	.1055	.0620
13	.6482*	-.2772	.1583	-.0218	.0095
14	.5649*	.2183	.1522	.0823	.1565
15	.2367	-.0386	.7335*	.0830	.1531
16	.2562	.0227	.5984*	.1912	.0076
17	.0799	.3250	.0090	.5191*	.1524
18	-.0213	-.2891	-.0474	.7774*	.0078

[1]Rounded to four decimal places.

*Weightings with absolute values of .40 or greater.

Table 3

Description of the Five Factors Extracted

from 18 Questionnaire Items

Factor	Item	Description of Item	Suggested Label
1	9	independent study at individual pace	Reasons for taking correspondence courses
	10	fear of student activism on campus	
	11	earning a better grade through correspondence study	
	13	efficient use of study time	
	14	gain or regain confidence in academic abilities	
2	5	listen to comments of lesson-grader	Innovating suggestions for changing correspondence courses
	6	occasional meeting with professor in correspondence area	
	7	meeting with another student taking same course	
3	12	earn a grade in a minimum of time	Appeal to individual considerations
	9	independent study at individual pace	
	15	develop abilities and interests	
	16	individualized attention	
4	4	personalized completion schedule	External pressures
	5	listen to comments of lesson-grader	
	17	pressure from family or friends	
	18	economic pressure related to profession	
5	1	difficulty of course	Course characteristics
	2	interest of course	
	3	value of instructor's comments	

Table 4

Stepwise Multiple Regression: Scheme I

Variable Entered	Standard Regression Coefficient	Standard Error of Standard Regression Coefficient	R
3-Reasons for taking correspondence course	-.2794	.0866	.2224
5-Course characteristics	.2096	.0866	.3003

Table 5

Stepwise Multiple Regression: Scheme II

Variable Entered	Standard Regression Coefficient	Standard Error of Standard Regression Coefficient	R
3-Reasons for taking correspondence courses	-.2790	.0864	.2229
5-Course characteristics	.2112	.0864	.3019

Table 6

Stepwise Multiple Regression: Scheme III

Variable Entered	Standard Regression Coefficient	Standard Error of Standard Regression Coefficient	R
3-Value of instructor's comments	.2090	.0822	.2175
4-Personalized completion schedule	-.2598	.0833	.2872
6-Meeting with professor in area	-.1769	.0849	.3409
7-Meeting with another student in course	.1410	.0863	.3717
9-Independent study at individual pace	-.1452	.0827	.3982
17-Pressure from family	.1831	.0834	.4193

It should be recalled that in Schemes I and II, variables 3 and 5 are actually factors. However, in Scheme III, variables 3, 4, 6, 7, 9, and 17 are questionnaire items.

Further, it is interesting to note that the additional information originally coded onto the questionnaire, i.e., type of assistance, course level, number of lessons in the course, hours of course credit, and educational level, did not account for any criterion variance. Hence, it does not appear that these variables are useful predictors of success in a correspondence course.

It can be noted from Tables 4 and 5 that the multiple correlation coefficient obtained under Scheme I ($\underline{R}$=.3003) is almost identical to the $\underline{R}$ obtained using Scheme II ($\underline{R}$=.3019). The highest value of $\underline{R}$ ($\underline{R}$=.41922) was obtained with Scheme III, i.e., when all 24 variables (18 questionnaire items plus six additional items) were included in the analysis.

Summarized in Table 7 are the multiple correlation coefficients and the proportions of criterion variance obtained in each of the three analyses. It can be seen that approximately two times as much criterion variance is accounted for in Scheme III as is in Schemes I and II. The power of predicting success using Plan III is twice that of either Scheme I or II.

Insert Table 7 about here

It appears that Scheme III is more useful in predicting success in a correspondence course and in accounting for variance in the criterion measure. Additionally, of the three methods, Plan III requires the least amount of programming effort and time. Further, the cost to execute Plan III is less than either Scheme I or II. Thus, these three factors combine to make Scheme III the most attractive method of analysis.

Table 7

Multiple Correlation Coefficients and

Proportions of Criterion Variance

Scheme of Analysis	$\underline{R}$*	$\underline{R}^2$
I	.300	.090
II	.302	.091
III	.419	.176

*Rounded to three decimal places.

SUMMARY

Originally, the analyses planned for the present project were those outlined and entitled Scheme I. Plans II and III were the result of a "I wonder what would happen if..." question. For example, Schemes I and II differ primarily in that means were supplied for missing data at different points in the analyses (cf. pp. 5 and 6). It has been suggested that the two procedures did not yield highly discrepant results (cf. Tables 1, 2, and 7). Thus, it does not appear that the point at which mean values are substituted for missing data was critical in the analyses performed. Further, in Scheme III, the only analysis performed was stepwise multiple regression. No factor analysis was conducted and no factor scores were generated as was done in both Schemes I and II. It has been pointed out that Scheme III required the least programming time and effort, cost the least, and produced the largest multiple correlation coefficient. Therefore, in this project, it appears that the more simplistic approach is the most valuable one.

Additionally, the data utilized in this study were collected and assembled under the auspices of the Correspondence Division. Consequently, Scheme III is even more attractive as it requires less statistical sophistication and yields results that may be interpreted more readily by persons lacking advanced statistical training. Terms such as eigenvalues, orthogonal rotations, trace, principal axis factor analyses, item weightings, and factor scores probably mean little to an individual whose emphasis is not statistics.

The statistical models utilized in this study are fairly complex tools. It is generally assumed that data to be analyzed with these

tools can be described by an interval scale of measurement. Questionnaire data, however, are perhaps best described by an ordinal scale of measurement. It is not known by these authors how critical this factor is as much data in education and psychology are ordinal in nature, but are treated as interval measures. The point, however, is that it would be interesting to simulate data conforming to the requirements of an interval scale of measurement and perform the three analyses again.

In terms of recommendations for future projects, it is suggested that additional exploratory studies of success in correspondence courses be performed. The scope of study might be extended to include personality variables such as motivation and perserverance. Since "lesson-turn-around time" is frequently two to three weeks, perserverance to complete the correspondence course would indeed be an interesting variable to examine. Perhaps, the power to predict success could be increased if these variables, as well as those presented in Table 6, were included in the regression analysis.

To summarize the present research effort:

1. Three schemes of analyses were conducted.
2. Scheme III was judged to be the most useful.
3. It has been suggested that personality variables be examined in future exploratory studies of success in a correspondence course.

REFERENCES

Anderson, T. H., & Tippy, P. H. An exploratory study of correspondence courses. Unpublished manuscript, University of Illinois, Champaign-Urbana, 1971.

APPENDIX A

Division of University of Illinois Extension
Correspondence Courses
104 Illini Hall
Champaign, Illinois 61820

Instructions: Circle the most appropriate alternative in each question.

1.	How difficult is the course? Is it.....	Easy	1
		Difficult	2
		Very difficult	3
		Impossible	4
2.	How interesting is the course? Is it.....	Very uninteresting	1
		Uninteresting	2
		Neutral, so-so	3
		Interesting	4
		Very interesting	5
3.	Do you plan to take another correspondence course after completing your present course(s)?.....	No	1
		Very doubtful	2
		Only if I need to	3
		Yes	4
4.	Please rate the value of the instructor's comments.....	Not helpful	1
		Somewhat helpful	2
		Helpful	3
		Very helpful	4
5a.	Did you 'set-up' your own lesson completion schedule for your correspondence course?.....	No	1
		Yes, but did not write it down	2
		Yes, wrote one down in formal fashion	3
5b.	Are you on schedule or have you fallen behind?.....	Behind and cannot catch up	1
		Behind and can catch up	2
		On schedule	3

Instructions: Circle a number for each category.

		Yes	Maybe	No
6.	Would you like to establish a personalized completion schedule and have the Correspondence Courses Office remind you if you fall behind your schedule?	3	2	1
7.	Would you be willing to pay for the mailing and handling charges for a service such as the one mentioned above (about $5.00 extra)?	3	2	1
8.	Do you think that it would help your comprehension of lesson materials if you could listen to comments from your lesson-graders?	3	2	1
9.	Do you think you would benefit more from the use of taped (audio) evaluations of your lessons, compared to the written evaluation now employed?	3	2	1
10.	Do you think that an occasional meeting with a professor in your correspondence study area would be beneficial?	3	2	1
11.	Would you be willing to travel to the Champaign-Urbana campus or perhaps to a regional center and meet with such a person?	3	2	1
12.	Do you think that 'meeting with' someone else who is taking the same course concurrently with you would aid you in studying?	3	2	1
13.	If you knew the names, addresses, and phone numbers of other students in your geographical area taking the same correspondence course, would you meet with them in a joint study effort?	3	2	1

14. Are there any individuals--family members, friends, instructors, an employer, etc. who are especially helpful to you in the course and/or who give you special encouragement to complete the course?
Use the space below or on back to list these individuals (not necessarily by name) and to describe the type of assistance you receive.

15a. Listed below are several reasons why students choose to take correspondence courses rather than 'live classroom' courses like those offered on the University of Illinois campuses or in regional centers. Please indicate how important or unimportant each of the following factors was in your choice of correspondence study. Circle a number for each category.

		Very Important	Important	Somewhat Important	Not at all Important
1.	All factors considered, the relative inexpensiveness of correspondence study	4	3	2	1
2.	Opportunity for independent study at individual pace	4	3	2	1
3.	Fear of resident study due to current student activism on campus	4	3	2	1
4.	Possibility of earning a better grade in certain courses through correspondence study	4	3	2	1
5.	Pressure to earn specific course credit in a minimum of time	4	3	2	1
6.	More efficient use of study time	4	3	2	1
7.	Opportunity to gain or regain confidence in academic abilities without pressures of classroom competition	4	3	2	1
8.	Opportunity to further develop abilities and cultural interests	4	3	2	1
9.	Opportunity for special individualized attention from the instructor	4	3	2	1

	Very Important	Important	Somewhat Important	Not at all Important
10. Pressures from family and/or friends for greater intellectual involvement	4	3	2	1
11. Economic pressures related to the job or profession	4	3	2	1

15b. What was the most important reason? It is No. ___ from the above list.

APPENDIX B

Variable	
1	Difficulty of course
2	Interest of course
3	Value of instructor's comments
4	Personalized completion schedule
5	Audio comments of lesson grader
6	Meeting occasionally with professor in area
7	Meeting with someone else concurrently enrolled in course
8	Inexpensiveness of correspondence study
9	Independent study at individual pace
10	Fear of student activism on campus
11	Possibility of earning a better grade
12	Earn a grade in a minimum of time
13	Efficient use of study time
14	Gain or regain confidence in academic abilities
15	Develop abilities and cultural interests
16	Individualized attention
17	Pressures from family and/or friends
18	Economic pressures
19	Special assistance or encouragement
20	Hours of course credit
21	Course level
22	Number of lessons in course
23	Course grade
24	Educational level

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